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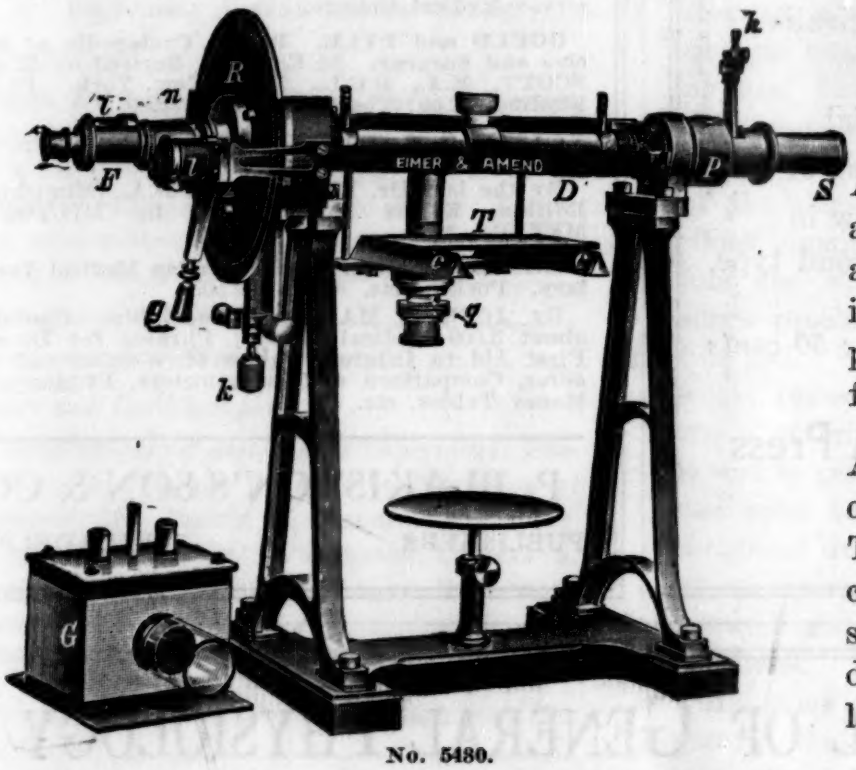

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SOME CONDITIONS FOR EFFECTIVE RESEARCH[1]

THE first requisite for effective research has to do with the make-up of the research worker. Although it is outside the province of this paper to enter into an exhaustive discussion of the qualifications of a scientist, it is pertinent to point out some of the most essential characteristics. Training, intellectual power, physical fitness, application and integrity are requirements which need no explanation. Stability is a trait which is often given too little weight. Some of the ablest men are affected with a restlessness which impairs their usefulness. We need investigators who will devote a lifetime, if necessary, to a single problem instead of pursuing the latest scientific fad. In research, as in other fields, he who would succeed must be able to stand up under the strain of criticism, disappointment and failure. It is well to get away from the notion that the research man must be a genius or an abnormal type. With occasional exceptions he is merely an average person whose training and experience have fitted him for research and perhaps rendered him unfit for other vocations.

Assuming that we have the right type of investigators, what is needed to make their efforts most productive? The time was when the research worker's equipment consisted almost solely of an inquisitive frame of mind. This is still a primary requisite, but this alone is not enough. We are in an era of experimental research where facts count for more than logic. The world is no longer satisfied with general laws and principles. There is a call for specific information on thousands of subjects ranging from the education of children to the prediction of weather. Modern research requires modern facilities. This may mean laboratories fitted with expensive instruments, or it may mean comparatively limited apparatus but abundant facilities for travel and transportation. Research is as dependent upon equipment as is the modern factory.

The volume of work is so great that only a small part of it can be performed by investigators of first magnitude. This situation can be met by delegating work of a routine character to assistants who are trained to perform such duties but who for one reason or another are not qualified for independent research. Where a large number of instrumental

[1] Read at the fifth annual meeting of the Southwestern Division of the American Association for the Advancement of Science, El Paso, Texas, May 5 to 7, 1924.

readings is required, these can often be made as well by an apprentice as by a seasoned investigator. Draftsmen, accountants and typists can take a great load from the shoulders of the research worker. These well-known principles are not always practiced, with the result that research talent is wasted on relatively unimportant details.

Very often the investigator encounters problems which lead him outside the field in which he is trained. Studies of plant life, for instance, call for a knowledge not only of plants but of physics, chemistry, meteorology, geology and soils, not to mention the many phases of biology. Since the capacity of one individual to master various branches of science is limited, the logical solution is to obtain the assistance of specialists in the fields where he finds his own training deficient. Theoretically, the proper method of handling such problems is by a coordinated plan of attack involving specialists in the various lines concerned. In practice, such cooperation is difficult to secure because each worker usually finds his time more than taken up by his own problems.

All the foregoing suggestions point to the need for organized institutions for research where equipment, technical assistants and clerical help are provided and where the efforts of individual workers may be coordinated. There can be no doubt that such organizations promote efficiency. The one thing to be guarded against in any organization, however, is undue curtailment of individual freedom. This danger is especially great in state and government work, where appropriations are often made for specific projects or lines of work, and where the worker may be placed under pressure to make a quick showing of results. On the other hand, supervision and restrictions are often necessary to insure the direction of work along useful channels. Whether or not the advantages aimed at in organized research are realized depends very largely upon the directing head. In a large organization this head may be obliged to devote his time largely to administrative duties. He must be an administrator and at the same time a broad-gauge scientist—a combination which, unfortunately, is difficult to find.

By no means the smallest considerations are those affecting the living conditions, the home and social life of the workers. The research man is no longer a recluse who shuts himself up in a laboratory and whose thoughts are centered entirely on his own problems. He is made of the same clay and has much the same needs and desires as other human beings. If he lives a life of self-denial it is usually because of a small income rather than because of the exactions of his calling. He may be willing to make personal sacrifices for the sake of science, but he strives to give his family the advantages to which he feels that they are entitled. The opportunities for social life, recreation and contact with interests outside of his own profession afforded by adequate compensation will make of him a better scientist and a better citizen. If research does not offer such opportunities, it can not hope to attract men of ability.

Much depends upon the objects of research. But when we attempt to classify different kinds of research as to relative merit we immediately encounter difficulties. The discoveries which pass unnoticed to-day may acquire vast importance to-morrow. Investigations which aim directly at the solution of current problems command greatest attention from the public and even in the scientific world; yet every scientist knows that without the general store of knowledge accumulated by fundamental research the solution of current problems would be impossible. In the present age when utilitarian investigations are occupying the foreground we must look to our universities and institutions of a similar character to uphold fundamental research.

To make the most of his intellectual powers and opportunities every research worker should have a worthy incentive. Scientists take just pride in the feeling that their work is more to them than the means to a livelihood. To the true scientist the love of research is its own reward; but it is not an adequate reward. The thrill of discovery is a stimulus which quickens the pulse and brings forth temporary bursts of enthusiasm and energy, but it is not a sustaining force. Public appreciation and the esteem of fellow-workers has a strong appeal. The fact that positions of responsibility and distinction await those who can qualify for them is a spur to greater achievement. The greatest reward that can come to the research worker is to see the result of his labors applied in some line of human endeavor. In research, as in all other callings, service to mankind is the true measure of success.

Whatever may be the specific needs of research, their fulfillment is conditioned upon public approval. Whether research is supported by taxation or by private bequest, the public ultimately pays the bill. Those in whose power it lies to render material aid to research are usually not sentimentalists but business men, in the broader sense, who expect commensurate returns for every dollar expended. We must convince these people that research is a good investment. We must teach them to measure values by other standards than the dollar, but at the same time we must not ignore this standard. The medium through which the public can be most extensively reached is the press. Not all research problems lend themselves to popular treatment, but most subjects

can be presented in such form as to interest the more thoughtful and enlightened class of people. Needless to say, the aim of popular articles should be educational and should contain no suggestion of propaganda. Under certain conditions more can be done by personal contact than by writing. We should welcome every opportunity to explain our work to those who exhibit an interest in it. Above all, we should let it be known that we have definite objectives, and as far as possible point out what the attainment of these objectives will accomplish. It thus becomes the duty of research not only to discover new facts but also to disseminate and impress them upon the public conscience, for it is only when the public understands the value of research that it will be accorded the place it should occupy in our national life.

G. A. PEARSON

SOUTHWESTERN FOREST EXPERIMENT STATION,
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A SUGGESTION FOR ABSTRACTS OF ANTHROPOLOGICAL LITERATURE

THE informing idea of abstracts is that, as cut-shorts, they indicate the important knowledge printed in a specific article about a certain subject. By their perusal the reader may quickly know whether or not he desires to read the original article. An abstract is simply a short, impersonal analysis of a longer printed original. It does not criticize or comment.

Abstracts are of two main kinds: One is the so-called *author's abstract;* the other may be called the *collaborator's abstract.*

The author's abstract is prepared by the author. It may have two designations—depending on whether it appears with the article abstracted, or appears separately. The former is a "preliminary abstract" —being a short digest of the longer article which immediately follows it in the same volume. When the author's abstract appears separately it may be designated a "lifted abstract"—which, elsewhere, was a preliminary abstract but which has now been lifted from the place of its first printing and appears unaccompanied by the article of which it is the abstract.

The second of the main kinds of abstracts, the collaborator's abstract, is prepared by a collaborator and not by the author. It is unaccompanied by the original article. In other words, the collaborator's abstract is never a preliminary abstract; it is more nearly akin to the lifted abstract.

Both the author's abstracts and the collaborator's abstracts may have been, and probably ought to have been, under the blue pencil of an expert editor, but the work of the editor as such does not give name to the abstract.

NEED FOR ABSTRACTS

The need for abstracting the literature in a scientific field is inevitable at a certain advanced stage in the increasing amount of the published data in that field. No one who teaches a full-time schedule can read all he desires to read, or ought to read, in any live scientific field to-day. His available time is insufficient. All of us habitually lay aside for vacation reading certain excellent articles or books which come to our libraries in the busiest periods of the university year.

If we agree that this is the condition in anthropology, what is to be done in an attempt to meet the situation? We must note, in passing, that we are not going to publish fewer articles in anthropology, simply because constantly we are publishing more—as all other growing sciences are doing. There are two reasonable answers to our question: *One,* we can, of course, read our customary amount and "forget" the increasing amount which, like the waters, will go over us if we sit still. This, as we grow old, all of us may increasingly do; but it is an extremely difficult thing for a vital American thus to sit still and let the waters go over him. *Two,* we can get some one else to read for us much of the increasing volume of printed matter.

A few of the most productive American scholars have possessed private funds, or other sources equally as rare to American university professors, which have enabled them for years at a time to multiply, as it were, their brains, pens and typewriters, and they have thus been able to accumulate for personal use a vast fund of information. Thus a secretary and a staff of readers read virtually everything, excerpting or abstracting those parts which it is believed their employer desires. This glimpses the plutocratic stage of abstracting, possible for only a few men.

PRESENT STATUS OF ABSTRACTING IN UNITED STATES

To-day the democratic stage of abstracting has dawned in a few fields for the use of all workers in those subjects. I quote the advertisement of a new abstract service to show how democratic and how inexpensive this service is in the field of sociology:

> The new abstract service offered by the American Sociological Society will provide subscribers with galley proof of the 100 abstracts each issue, 600 a year appearing in the *American Journal of Sociology,* of articles from the leading social-science periodicals in English, French, German, Italian, Scandinavian, and Spanish.

This service is to cost each subscribing member of the society one dollar per year. The following, ac-

cording to the advertisement, is what the member will receive for one dollar—non-members are to pay two dollars for the same service:

(1) Galley proof of these abstracts will be mailed before the publication date of each issue of the journal.

(2) The thin galley proof paper is adapted to satisfactory mounting on 3x5 cards. Any other form of abstract service, as by cards or slips, was found prohibitive in cost.

(3) The classification number at the end of each abstract will be found particularly helpful.

What else is for sale to-day in the American market which one can buy six for one cent? Again, we have an illustration of the cheapness in commodity production of those things democracy will buy many of, if the price is low enough. In other words, the democratic stage of abstracting is here—for a few natural and social sciences.

A partial, though nearly complete, list of scientific journals published in America which regularly carry preliminary abstracts with each of their articles would probably not exceed thirty. Among those journals best known to anthropologists are the following: *American Anatomical Memoirs; American Journal of Anatomy; Anatomical Record.*

If we step aside into the sociological field, and look at current numbers of the *American Journal of Sociology,* we see the best type of abstracting in any field near our own. I mean by the expression "best type" that each issue has both the preliminary abstract before each article it publishes, and also the lifted abstracts from other periodicals; and, in addition, and more important, it has also collaborator's abstracts of all noteworthy articles appearing in America and in Europe within the social-science field. These abstracts are also all printed in English, whereas abstracts printed by some other journals in America are lifted bodily and appear in the original language. However, the individual abstracts in the above periodical are not always of the best, largely because of the newness of abstract writing. But the objective has been visioned and the effort to reach it will undoubtedly bear better fruit in the near future when a standard has been set and accepted for the best type of scientific abstracts.

Status of Abstracts in Anthropological Journals[1]

Types of abstracts				Name of Periodical
Preliminary.	Lifted	Bibliography	Review	
				nograficzne. irr.
		x		American Anthropological Association. Memoirs. Lancaster, Pa. irr.
			x	American Anthropologist. Lancaster, Pa. q.
	x	x	x	American Journal of Physical Anthropology. Washington, D. C.
No abstracts				American Museum of Natural History. Anthropological papers. New York. irr.
			x	Annals of Archaeology and Anthropology. Liverpool. q.
No abstracts				Anthropological Society of Bombay. Journal. Bombay. irr.
	x	x	x	Anthropologie—Published by the Anthropological Institute, Charles University of Prague. (In Czecho-Slovakia.)
		x		L'Anthropologie. Paris. bi-m.
			x	Anthropologische Gesellschaft in Wien. Mitteilungen. Wien. bi-m.
No abstracts				Anthropologischer Verein in Schleswig-Holstein. Mitteilungen. Kiel. irr.
		x	x	Anthropos. Internationale Zeitschrift für Völker- und Sprachenkunde. bi-a.
		x	x	Archiv für Anthropologie. Braunschweig. irr.
		x	x	Archiv für Kriminal-Anthropologie und Kriminalistik. Leipzig. irr.
		x	x	Archiv für Rassen- und Gesellschafts-Biologie. Munich.
	x	x	x	Archives d'anthropologie criminelle. Lyon. m.
			x	Archives suisses d'anthropologie générale. Genève. irr.
		x	x	Archivio di antropologia criminale. Torino. bi-m.
No abstracts				Akademija umiejetnosci, Cracow. Materyaly antropologiczno-archeologiczne i et-
		x		Archivio per l'antropologia e la etnologia. Firenze. 4 nos. a year.

STATUS OF ABSTRACTS IN ANTHROPOLOGICAL JOURNALS[1]

Types of Abstracts				Name of Periodical
Prelim-inary.	Lifted	Bibli-ography	Review	
				Beiträge zur Anthropologie und Urgeschichte Bayerns. München. q.
No abstracts				Columbia University Contributions to Anthropology. New York. irr.
No abstracts				Field Museum of Natural History. Publications: Anthropological series. Chicago. irr.
No abstracts				International Journal of American Linguistics. New York City.
	x			Institut français d'anthropologie. Comptes rendus des séances. Paris. irr.
No abstracts				Journal of Negro History. Washington, D. C.
		x		Journal of Race Development. Worcester, Mass. q.
		x		Königliches zoologisches und anthropologisch- ethnographisches Museum zu Dresden. Abhandlungen und Berichte. Leipzig. irr.
	x			Man. London. m.
	x	x		Niederlausitzer Mitteilungen. Guben. irr.
		x		Philippine Islands—Bureau of Science. Philippine Journal of Science. Section D: General biology, ethnology and anthropology. Manila. bi-m.
	x			Politisch - anthropologische Monatsschrift. Berlin. m.
x		x		Revue anthropologique. Paris. m.
		x		Rivista di antropologia. Roma. 3 nos. a year.
x(summary)	x	x		Royal Anthropological Institute of Great Britain and Ireland. Journal. London. bi-y.
	x	x		Russki anthropologicheski zhurnal. Moscow. q.
x	x	x		Société d'anthropologie de Lyon. Bulletin. Lyon. y.
		x		Société d'anthropologie de Paris. Bulletins et mémoires. Paris. bi-m.
		x		Société dauphinoise d'ethnologie et d'anthropologie. Bulletin. Grenoble. q.
			x	University of Pennsylvania-Museum. Anthropological publications. Philadelphia. irr.
			x	Ymer. Stockholm. q.
		x		Zeitschrift für Ethnologie. Berlin. bi-m.

THREE TYPES OF GENUINE ABSTRACTS VARYING IN RELATIVE COMPLETENESS

The simplest type of abstract is the *title abstract.* Dr. J. R. Schramm, executive secretary of the division of biology and agriculture, National Research Council, has recently analyzed abstracts of all three types. In an unpublished paper he concludes that title abstracts present roughly 40 per cent. of the data appearing in the original article. Title abstracts are simply customary bibliographical entries. Those appended to research articles published in scientific periodicals illustrate this type; but data in original articles to the extent of 60 per cent. are unknown to the person who reads only title abstracts of articles.

The second type is the *partial abstract.* It carries, roughly, about 60 per cent. of the data appearing in the original article. Abstracts prepared today by most authors of anthropological papers would

[1] Under this heading everything has been listed which suggests the contents of a definite article. Even with all this generosity the showing is poor, indeed. "Bibliography" covers only title abstracts. A "Review" today is often not an abstract at all. Too often reviews are only smart remarks which the publication gave the reviewer occasion to utter.

The check mark (x), preceding the name of each periodical, designates the type of so-called abstract appearing more or less regularly in that periodical.

The list of periodicals includes only those available in one or the other of the following libraries: Surgeon General's Office and Bureau of American Ethnology in Washington, D. C., and N. Y. Public Library in New York City.

probably be of this type—preceding instruction in preparation of a better type. Thus 40 per cent. of the data in the original article is unknown to the reader who has access to only the partial abstract.

The third type is the *complete abstract*. It carries 100 per cent. of the data or entities of the original article. The complete abstract prepared to meet definite standards occupies between 4 per cent. and 5 per cent. of the space of the original article—as scientific articles are now commonly printed. However, a complete abstract does away entirely with the need of a summary at the close of the original article. So, if articles are written with the certainty that they are to be abstracted, they no longer need to carry summaries. Therefore, the printing of a complete preliminary abstract, in addition to the original article, minus its usual summary, need add very little, if any, to the space required for printing the original article with its customary summary.

The standard Dr. Schramm sets for complete abstracts is that every entity appearing in the original article will appear, in its proper sequence, in the complete abstract, and that it will appear in at least one complete sentence; frequently it will have more than one sentence. Some one has urged that only new data should appear in the abstract, but this is not enough. Each entity in the original, whether or not new, must appear in the abstract, if it is to be complete.

Further, the standard, scientific complete abstract thus will carry every entity that should go into the index. In other words, the indexer may, and would, prepare his index entries directly from the abstract by the process, as it were, of abstracting the abstract. Thus, the index entries will show the very quintessence of the original article without consumption by the indexer of the much longer time consumed in digesting the longer original article.

ADVANTAGES TO THE INDIVIDUAL OF COMPLETE ABSTRACTS

(1) They greatly add to our equipment of scientific knowledge by giving us a digest of many more articles than we can possibly read in the longer original.

(2) They save us much time which is now more or less wasted in reading original articles of no great importance to us, but whose titles suggest contents of real value to us.

(3) They save us considerable money, by cutting down our subscription list of those periodicals about which we debate at each time of annual subscription.

(4) They save us library space in book shelves, and filing cabinets for periodicals, separates and fugitive articles.

(5) They probably will assist most of us in tending to develop a technique, even habits, of more logical analysis in our writings, and greater clearness in our presentations. On the certainty that we or collaborators must abstract the article, more logic will almost necessarily go into its preparation.

(6) They will save greatly in editorial work in the preparation of index entries for the volumes composed of the several current periodicals with abstracted articles.

ALBERT ERNEST JENKS,
Chairman, Division of Anthropology and Psychology
THE NATIONAL RESEARCH COUNCIL

SCIENTIFIC EVENTS

RESEARCH BUREAU OF METALLURGY AT THE CARNEGIE INSTITUTE OF TECHNOLOGY

As a further step in the plan to expand its scientific research facilities, announcement is made by the Carnegie Institute of Technology in Pittsburgh of the establishment of a special Research Bureau of Metallurgy to begin its work the first of September, 1924. The object of the new department is to apply to metallurgical questions the recent discoveries in the field of physics and chemistry. The organizing of this new bureau is the second important development concerning metallurgical research that has been reported during the year at the Pittsburgh institution. The first step, as was previously announced, was the adoption of a definite program of investigations in metallurgy to be made by the department of metallurgy at the institute in cooperation with the U. S. Bureau of Mines. Several college graduates have already been appointed to fellowships by the institute authorities to carry out the program of research problems, the investigators to have the financial aid and assistance of an advisory board of metallurgical engineers and steel manufacturers of Pittsburgh in addition to the cooperation of the Bureau of Mines. The new research bureau of metallurgy just organized will be a department established separately from the research investigations carried out by the department of metallurgical and mining engineering in cooperation with the Bureau of Mines. Dr. Francis M. Walters, Jr., has been appointed director and Dr. Vsevolod N. Krivobok has been appointed as an assistant. The appointment of another assistant, a specialist in X-ray work, will be made during the summer months.

As director of the bureau, Dr. Walters will also have the title of professor of experimental physics.

For the past two years he has been connected with the U. S. Bureau of Standards in Washington, D. C., as associate physicist. The members of the new bureau will devote their time almost exclusively to research. At first the work will be entirely of a theoretical nature, but it is expected that as progress is made the study of a certain number of practical questions will be undertaken.

ZOOLOGICAL FIELD LABORATORY OF THE UNIVERSITY OF KENTUCKY

THE University of Kentucky announces the establishment of a Zoological Field Laboratory near Quicksand in Breathitt County, Kentucky, which will be opened to students in the summer of 1925, as a part of the development of the recently acquired Robinson Mountain Lands.

The field laboratory consists of about five hundred acres of typical mountain country which shows almost perfect primeval conditions in native fauna and flora. It is extremely rugged, well timbered and watered, with attractive topographical features and unusual biologic resources. It is very rich in the number of species of insects, snakes, birds and mammals represented. Several mountain streams flow into the Kentucky River and Quicksand Creek on two sides of the laboratory so that exceptional facilities are offered for the study of aquatic life. The property includes some of the most picturesque of Kentucky mountain scenery. Suitable buildings and equipments will be provided for field laboratory work.

Through the courtesy of the College of Agriculture, students at the Field Laboratory will have the privilege of doing collecting, exploring and research over nearly fifteen thousand acres of closely adjacent mountain land in Breathitt, Perry and Knott Counties, including some of the roughest and least inhabited portions of the state. Part of the field laboratory will be set aside as a bird sanctuary.

The Zoological Field Laboratory will offer opportunity for research work in ornithology, entomology, herpetology and ecology at all seasons of the year, and for regular class instruction during the summer session. It will be under the direction of Dr. W. D. Funkhouser and Dr. W. R. Allen, of the department of zoology of the University of Kentucky.

CONFERENCE ON THE INGREDIENTS OF BACTERIOLOGICAL MEDIA

ON May 19, 1924, a conference was called at the Hotel Astor, New York City, to discuss the steps necessary in order to secure standardization of the raw materials of bacteriological media, such as peptones, agar, gelatin and so forth. The conference was called by the Society of American Bacteriologists through its committee on bacteriological technic; but representatives of various other organizations were invited. Those represented were: American Chemical Society, American Public Health Association, American Water Works Association, Dairy Science Association, the Dairy Inspectors' Association, the Society of American Bacteriologists, also two of the large public health laboratories, namely, the Hygienic Laboratory of the U. S. Public Health Service, and the Research Laboratories of the N. Y. City Board of Health.

The meeting was called to order by the chairman of the committee on bacteriological technic of the Society of American Bacteriologists who, by general consent, took the chair. He pointed out briefly the need of standardization in the field to be considered by the conference, but showed that much investigation would have to precede such standardization, and that this investigation would require the cooperation of all the organizations represented. The need of such cooperation was agreed to by all; but before taking up the means for bringing it about, considerable time was spent discussing the particular problems likely to be encountered in the work.

It was pointed out that the chief ingredients of culture media are: peptone, sugars, agar and gelatin. The need of standardization of sugars was recognized, but on account of the complexity of the problem and its smaller degree of urgency than in the case of some of the related problems, it was decided not to consider sugars at the present time, but to recognize them as a possible subject for similar investigation in the future. It was also pointed out that the problems in the case of agar and gelatin were likely to be fairly simple. For these reasons it was decided to give chief attention at present to peptone.

The various uses of peptone were considered: as a basis of media for the cultivation of miscellaneous bacteria; as the most important ingredient of the media used in counting water bacteria, and also milk bacteria; as one of the important constituents of media for studying fermentation; as the basis of the medium used in obtaining diphtheria toxin. It was suggested that each use might present a problem of its own and that it might be necessary to obtain a different type of peptone for each purpose; but it was generally hoped that one type might be found suitable for all purposes. It was decided that the only way to make progress would be to obtain various peptones of fairly definitely known composition and to learn which of them are best for which purposes by distributing them for testing among various bacteriologists. The matter of obtaining such batches of peptone was referred to the only manufacturer of

peptones present, a representative of Parke Davis and Co. He stated that his company kept a record of each batch of peptone made and would gladly furnish with each sample submitted the analysis of that batch as made in their laboratories. The opinion was expressed that the other manufacturers would probably be glad to do the same; but it was pointed out that different companies might make different kinds of analysis and it was suggested that one of the first tests of the contemplated investigation would be to standardize the type of analysis to which peptones should be submitted.

After discussing these various points to be investigated the matter of organizing the work was considered. It was the general opinion that so far as possible no new organization should be created, but that existing organizations should be used. It was pointed out that every organized body represented at the meeting had some committee dealing with the subject under discussion, and that a coordinating committee representing each of these individual committees would be sufficient to insure the needed cooperation. Accordingly the motion was made that a coordinating committee be appointed composed of the chairmen (or their representatives) of the various committees now in existence whose functions cover the matter of bacteriological media, this coordinating committee to put into operation a cooperative investigation looking toward the standardization of the ingredients of bacteriological media; and that the chairman of the committee on bacteriological technic of the Society of American Bacteriologists serve as chairman of the coordinating committee. This motion was seconded and carried by a unanimous vote.

PRELIMINARY ARRANGEMENTS FOR ATTENDING THE TORONTO MEETING OF THE BRITISH ASSOCIATION

PRELIMINARY programs of the approaching Toronto meeting of the British Association (which will occur from August 6 to August 13) have been sent to all members of the American Association residing in the United States. These were sent out from the Washington office of the American Association for the Advancement of Science, under authorization received from the council at the Cincinnati meeting. The American Association is omitting its summer meeting this year because of the Toronto meeting of its sister organization and the British Association has cordially invited all American scientists to be present. It is hoped that many members of the association will be able to attend the great international gathering of scientists and friends of scientific progress.

The following notes will interest persons planning to go to the Toronto meeting from the United States. Reduced railway rates, on the certificate plan, have been granted by the New England, Trunk Line, Central, Eastern Canadian and Western Canadian Passenger Associations. There will be advantageous round-trip excursion tickets available from regions not cared for by the special rates.

Persons intending to go to the meeting should consult their local railway agents, stating that they desire to attend the Toronto meeting of the British Association. If the special privilege is available from their station they should purchase a one-way, through ticket to Toronto and secure a certificate on the "standard certificate form." (A receipt is not needed.) On arrival in Toronto the certificate is to be presented in the reception room at the meeting. It will there be validated and *after validation* it will entitle the holder to purchase at the railway office a return ticket at one half the regular one-way rate.

If the special reduced rates are not available from your station you may purchase a round-trip ticket to some station from which you can secure the certificate privilege and then proceed as above. Or you may secure a round-trip to Toronto at excursion rates.

Persons traveling to Toronto on round-trip tickets to that place *should not neglect to report* this fact at the office in the reception room at the meeting, although there will be no certificates to be validated in such cases. Round-trip tickets are to be counted in making up the quota necessary for the special rates to those holding certificates.

We are informed that persons traveling to Toronto from the United States may have their baggage passed by the Canadian customs officers with little or no delay if they will state that they are going to attend the meeting of the British Association.

The honorary local secretaries for the Toronto meeting request that persons who plan to attend shall intimate this fact at the earliest possible time. Intimation blanks for this purpose were to accompany the preliminary programs sent to members of the American Association, but the shipment of blanks was delayed and it seemed best to send out the programs without them rather than to delay the sending until later, especially since the school and college year was about to close and many members might not have been reached if the sending had been further delayed. A supply of intimation blanks is available at the Washington office of the American Association and copies may be had on request. Intimation may be sent in without special blank, however. It should be addressed to the Honorary Local Secretaries, British Association, Room 50, Physics Building, University of Toronto, Toronto.

Intimation should include the name, titles and address of the sender. The fee for the meeting is $5 (transferable ticket, $6.50; student's ticket, $2.50—the latter for students not over 23 years of age, at

recognized educational institutions). A check, payable to the British Association for the Advancement of Science, should accompany the intimation to the honorary local secretaries, or payment may be made over the counter in the reception room at the meeting. The subsequently published report of the meeting may be subscribed for by those in attendance, at an additional price of $2.50. Members of the American Association in good standing may subscribe for the report without paying this additional fee, but they should clearly indicate their wish for it and claim this special privilege. Identification certificates for use in this connection have been placed in the hands of all members of the American Association who were in good standing at the time the preliminary programs were distributed from the Washington office.

The intimation blank requests information as to accommodations wanted at Toronto. A list of hotels and rates is shown in the preliminary program. *Hotel accommodations should be reserved immediately* if not already cared for; the hotels are apt to be crowded. Those desiring accommodations in the university or college residences or in a boarding house should intimate this to the honorary local secretaries.

It is asked also that persons planning to attend the Toronto meeting shall inform the honorary local secretaries in regard to their main scientific interests, so that the names of those planning to attend may be classified according to sections of the association. The sections of the British Association are as follows: A—Mathematics and Physics; B—Chemistry; C—Geology; D—Zoology; E—Geography; F—Economic Science and Statistics; G—Engineering; H—Anthropology; I—Physiology; J—Psychology; K—Botany; L—Educational Science; M—Agriculture.

BURTON E. LIVINGSTON,
Permanent Secretary, American Association for the Advancement of Science

THE TORONTO MEETING OF THE BRITISH ASSOCIATION

OVERSEA members of the British Association for the Advancement of Science coming to the Toronto meeting, beginning on August 6, include the following:

Section E—Geography

President—J. W. Gregory, professor of geology, University of Glasgow. His presidential address will deal with "The relation of white and colored races in reference to white colonization in the tropics."

Vice-president—Vaughan Cornish.

Recorder—R. N. Brown, University of Sheffield.

Secretary—W. H. Barker, professor of geography, University College, Southampton.

Frank Debenham, lecturer in geography in the University of Cambridge, was with Captain Scott in the Antarctic.

Miss R. M. Fleming, secretary of the Geographical Association.

Osbert John Radcliffe, secretary of the association, formerly geographical assistant to the editor of the "Encyclopaedia Britannica."

R. H. Kinvig, lecturer in the school of geography in the University of Liverpool.

Miss Marion Newbigin, editor of the *Scottish Geographical Magazine*.

John Hardwick Reynolds, assistant to the permanent committee on geographical names for the British Official Congress, the work of which is carried on at the Royal Geographical Society, London.

O. H. T. Rishbeth, lecturer in geography in University College, Southampton.

P. M. Roxby, professor of geography in the University of Liverpool.

A. Stevens, lecturer in geography in the University of Glasgow.

Alec Tweedie, traveler and writer on Iceland, Norway and Finland.

J. F. Unstead, professor of geography in the University of London.

Section H—Anthropology

President—F. C. Shrubsall, principal assistant medical officer, London County Council.

Vice-president—Charles E. Seligman, professor of ethnology in the University of London, president of the Royal Anthropological Institute.

Recorder—E. N. Fallaize, secretary of the Royal Anthropological Institute.

Secretary—Alexander Low, lecturer in embryology, Aberdeen.

Miss R. M. Fleming, secretary of the Geographical Association.

Dr. T. Ashley, director of the British School at Rome, who will speak on "Recent discoveries in Italy."

Henry Balfour, M.A., curator of the Pitt Rivers Museum, Oxford, will speak on "Anthropology and the administration of the affairs of native races."

Captain L. H. Dudley Buxton, University Museum, Oxford, will discuss "Ancient crania from the valley of Mexico," and will deliver one of the children's lectures at the meeting on "Beyond the great wall of China, and the people who live there."

A. C. Haddon, university reader in ethnology, Cambridge, will discuss "The distribution of early man."

R. R. Marett, dean of Exeter College, Oxford, will speak on "The cinematograph as an instrument of anthropology."

John Linton Myres, Wykeham professor of ancient history in the University of Oxford.

Harold J. E. Peak, ex-president of the anthropological section.

H. J. Rose, professor of latin in University College, Aberystwyth.

Section K—Botany

President—V. H. Blackman, professor of plant

physiology and pathology, Imperial College of Science, London. His presidential address will deal with "The physiological aspects of parasitism."

Vice-president—A. G. Tansley, lecturer in botany, University of Cambridge.

Recorder—F. T. Brooks, lecturer in botany, University of Cambridge.

Secretary—McLean J. Thompson, professor of botany, University of Liverpool.

Secretary—Wilfrid Robinson, lecturer in botany in the University of Manchester.

John William Bews, professor of botany, Natal University College, Pietermaritzburg, South Africa.

Miss K. B. Blackburn, lecturer in botany, Armstrong College, Newcastle-on-Tyne.

Sir J. C. Bose, founder and director of the Bose Research Institute, Calcutta.

H. H. Dixon, professor of botany, University of Dublin, director of Trinity College Botanic Garden.

H. S. Holden, lecturer in botany and zoology, University College, Nottingham.

Thomas Johnson, professor of botany in the Royal College of Science, Dublin; keeper of the botanical collections in the National Museum at Dublin.

J. H. Priestley, professor of botany, University of Leeds, will deliver one of the "children's lectures" at the meeting entitled "Plant waterproofs."

Alfred Barton Rendle, keeper of the department of botany in the British Museum.

Miss E. R. Saunders, Newnham College, Cambridge.

David Thoday, professor of botany, University College of North Wales, Bangor.

Miss Ethel N. Miles Thomas, head of the department of botany, University College, Leicester.

SCIENTIFIC NOTES AND NEWS

DR. F. W. MCNAIR, professor of physics and president of the Michigan College of Mines, was killed in a railroad wreck on June 30, while returning from the recent meeting of the Society for the Promotion of Engineering Education, of which he was at one time president. As previously recorded in SCIENCE, Dr. F. W. Ives, professor of engineering in the Ohio State University, died from injuries received in the same accident. Dr. John H. Dunlap, secretary of the American Society of Civil Engineers, was seriously injured.

AT the fourth International Conference of Soil Science, held in Rome, Italy, from May 11 to 20, it was voted to hold the next congress in the United States, probably in 1927. Dr. J. G. Lipman, dean of the college of agriculture and director of the experiment station at Rutgers University and the State University of New Jersey, was elected president of the next congress.

TRINITY COLLEGE, Dublin, has conferred the honorary degree of doctor of science on Dr. R. A. Millikan, of the California Institute of Technology, and on Professor E. B. Poulton, Hope professor of zoology in the University of Oxford.

THE University of Grenoble at a special ceremony held on June 5 conferred the degree of *Docteur honoris cause* on Professor Douglas Johnson, of Columbia University, exchange professor in engineering and applied science to the French Universities, and on Professor Albert Sauveur, of Harvard University. In connection with the ceremonies, a reception at the home of Recteur Guy, a banquet tendered by the University Council and an automobile excursion in the French Alps were arranged in honor of the recipients.

THE Royal Sanitary Institute has elected the following sanitarians to be honorary fellows: Professor Léon Bernard, Institute of Hygiene in Paris; Dr. Carlos Chagas, of the National Health Department, Brazil; Surgeon-General Hugh S. Cummings, U. S. A. Public Health Service; Professor C. Eijkman, Utrecht; Professor J. J. Van Loghem, Amsterdam; Professor Th. Madsen, director of the State Serum Institute, Copenhagen; Professor Donato Ottolenghi, of the University of Bologna; Dr. W. H. Park, bacteriologist to New York City; M. Albert Thomas, director of the International Labor Office, Geneva, and Mr. O. Velghe, of the Department of Hygiene in the Belgian Ministry of the Interior.

DR. JOHANNES SCHMIDT, director of the physiological department of the Carlsberg Laboratory, Copenhagen, has been elected a corresponding member of the French Academy of Sciences.

SIR NAPIER SHAW, professor of meteorology in the Imperial College of Science and Technology, London, formerly director of the Meteorological Office, has been elected a foreign member of the Royal Swedish Academy of Science in respect of his "masterly researches in the domain of meteorology."

PROFESSOR WILLIAM H. HOBBS, head of the geology department of the University of Michigan, has had conferred upon him the decoration of a Knight of the Legion of Honor by the French government.

PROFESSOR MAX RUBNER, formerly professor of physiology at the University of Berlin, celebrated his seventieth birthday on June 2.

DR. BARTON WARREN EVERMANN, director of the museum of the California Academy of Sciences and of the Steinhart Aquarium, sailed on the Matson Line Steamer *Maui* on July 23, for Honolulu, where he will attend the Food Conservation Congress to be held in Honolulu from July 31 to August 14, under the auspices of the Pan-Pacific Union. Dr. Evermann is chairman of the Fisheries Section of the Union and will urge the necessity for an early international

treaty for the protection of the marine mammals, fishes and other natural resources of the Pacific.

DR. T. H. MACBRIDE, president emeritus of the State University of Iowa, has left for San Juan Island, north of the Straits of Juan de Fuca, to study slime moulds.

DR. F. E. BREITHUT, U. S. chemical trade commissioner, returned to the United States on June 19, after a year spent studying conditions in the dye-producing countries abroad.

JOSEPH MAILLIARD, curator of birds and mammals; Frank Tose, chief taxidermist, and John Malloch, of the California Academy of Sciences, have returned to San Francisco from an extended collecting trip in northeastern California, where they obtained material for a number of new habitat groups of mammals and birds that will be installed in the academy's museum in Golden Gate Park. They secured many specimens of birds and mammals which have been added to the research collections of the academy, and also made a number of discoveries relating to the bird and mammal fauna of that part of California.

W. W. SARGEANT, secretary of the California Academy of Sciences and of the Pacific Division of the American Association for the Advancement of Science, is spending a year in Europe. During his absence, Dr. Barton Warren Evermann, director of the museum of the California Academy of Sciences, will serve as acting secretary of the Pacific Division. While in Europe Mr. Sargeant will visit book dealers and libraries in the interests of the academy library.

VILHJALMUR STEFANSSON, the Arctic explorer, who has started on an expedition into central Australia, is accompanied by the government geologist, L. K. Ward, of Adelaide.

MOUNT GEIKIE, 10,854 feet in height, the hitherto impregnable peak of the continental divide, has been scaled by Cecil Wales, of Edmonton, M. D. Geddes and Val E. Fynn, of St. Louis, Mo. Mount Geikie is in Jasper National Park.

A COMMITTEE has been formed under the honorary presidency of M. Millerand and M. Poincaré, to erect at Sion-Vaudèmont, a monument to Maurice Barrès, distinguished for his work on the organization of science in France.

DR. J. G. LIPMAN, dean of the college of Agriculture at Rutgers University, was one of the speakers at the celebration of the eighty-first anniversary of the founding of the Rothamsted Experimental Station, Harpenden, England.

LIEUTENANT-COLONEL ANDREW THOMAS GAGE, director of the Botanical Survey of India and superintendent since 1906 of the Royal Botanic Gardens, Calcutta, has been appointed librarian and assistant secretary to the Linnean Society of London.

DR. JAMES A. FARIS, research fellow of the Brooklyn Botanic Garden, is investigating smut diseases of grain, for the purpose of which a gift from private funds has been made.

AT the Mellon Institute of Industrial Research of the University of Pittsburgh, an industrial fellowship on the treatment of timber has been established. This research, which is being sustained by the Grasselli Chemical Co., of Cleveland, Ohio, and is being conducted by Dr. A. M. Howald, has for its purpose a study toward improvement of the methods of applying zinc chloride in the wood-preservation industry.

WILLIAM T. RICHARDS, Ph.D. (Harvard '24), has been awarded a fellowship in science by the International Education Board. He sailed early in July for Europe, and will study next year in the Cavendish Laboratory, Cambridge.

DR. CHARLES SCHUCHERT, of Yale University, will deliver a twelve weeks' course of lectures in advanced stratigraphy in the University of Arizona next winter.

SIR JETHRO JUSTINIAN HARRIS TEALL, eminent geologist and formerly director of the Geological Survey of the United Kingdom, has died at the age of seventy-five years.

FREDERIC MERRIFIELD, a well-known British entomologist, died on May 28, aged ninety-three years.

SIR JAMES J. DOBBIE, lately government chemist and formerly director of the Royal Scottish Museum, Edinburgh, has died at the age of seventy-one years.

DR. R. M. WALMSLEY, principal of the Northampton Polytechnic Institute in England, and formerly professor of electrical engineering and applied physics at the Harriat-Watt College, Edinburgh, died following a street accident on June 15 at the age of seventy years.

THE United States Civil Service Commission announces a competitive examination for associate mechanical engineer. Applications close on August 19. The examination is to fill a vacancy in the office of the Chief of Air Service, War Department, Washington, D. C., and vacancies in positions requiring similar qualifications, at an entrance salary of $3,000 a year. The duties of this position, under direction, are to develop improvements and supervise or conduct experimental tests on apparatus for the production, storage, purification and handling of helium, hydrogen and related gases.

THE Society for the Promotion of Engineering Education held its thirty-second annual meeting at the University of Colorado, Boulder, from June 25 to

28. The attendance, 362, exceeded all former records. The 150 members present represented 70 colleges, 38 states, Canada and Hawaii. The new officers of the society are: *President,* Dean A. A. Potter, of Purdue; *vice-presidents,* Professor R. S. King, Georgia Institute of Technology, and Dean G. B. Pegram, Columbia University; *secretary,* Dean F. L. Bishop, of Pittsburgh; *treasurer,* W. O. Wiley, of New York. The 1925 meeting will be at Union College, Schenectady, N. Y.

AT the first annual meeting of the American Orthopsychiatric Association held at the Institute for Juvenile Research, Chicago, on June 10, the following officers were elected: *President,* Dr. William Healy, Boston; *vice-president,* Dr. Arnold L. Jacoby, Detroit, and *secretary-treasurer,* Dr. Karl A. Menninger, Topeka, Kans. Among the speakers were Drs. Douglas A. Thom, Boston; David M. Levy, Chicago, and Bernard Glueck and Victor V. Anderson, of New York. The association was organized to study crime and other conduct disorders from a psychologic standpoint. Active membership is limited to psychiatrists engaged directly in the study and treatment of behavior disorders.

AT the annual meeting of the Canadian Medical Association held in Ottawa from June 17 to 20, under the presidency of Dr. John F. Kidd, Ottawa, the following officers were elected for the ensuing year: *President,* Dr. David Low, Regina, Sask.; *editor of the Canadian Medical Association Journal,* Dr. Alexander D. Blackader, Montreal, Que.; *treasurer and managing editor,* Dr. Alfred T. Bazin, Montreal; *chairman of council,* Dr. Alexander Primrose, Toronto, and *general secretary,* Dr. Thomas C. Routley, Toronto.

THE Pan-Pacific Food Conservation Conference to be held under the auspices of the Pan-Pacific Union, in Honolulu, from July 31 to August 14, will comprise the following groups: (1) International agreements regarding fisheries. (2) Economic entomology. (3) Plant pathology. (4) International quarantine policies. (5) Crop production and improvement. (6) Forestry. (7) Climatology. (8) Transportation and distribution of food products. (9) Topography—land and sea. (10) Animal husbandry.

UNIVERSITY AND EDUCATIONAL NOTES

A BUDGET of $24,240,000 has been drawn up for the reconstruction of the Imperial University of Tokio. The buildings were largely destroyed by the earthquake and fire of September 1, 1923.

S. A. COURTAULD has made a donation of £20,000 to endow the university professorship of anatomy in the medical school of Middlesex Hospital, London.

THE new medical college of the University of Rochester was dedicated, June 14, with the laying of the cornerstone by Dr. Benjamin Rush Rhees, president of the university. Dr. Edward Bright Vedder, Lieutenant-Colonel M. C., U. S. Army, was the principal speaker.

DR. KARL TAYLOR COMPTON, professor of physics at Princeton University, has been appointed professor of physics at the University of Chicago.

DR. HENRY C. SHERMAN, who has taught in the department of chemistry at Columbia University since 1899, has been designated Mitchell professor of chemistry, a title previously held by Dr. Charles F. Chandler.

DR. EUGENE L. PORTER, assistant professor of physiology at Western Reserve University, Cleveland, has been appointed professor of physiology at the University of Texas, succeeding Dr. Charles C. Gault, resigned.

DR. LLOYD W. TAYLOR, of the University of Chicago, has been appointed professor of physics at Oberlin College.

DR. T. S. LOVERING, of the University of Minnesota, has been appointed instructor in geology at the University of Arizona.

AT a meeting of the senate of the University of London, held on June 25, Professor E. A. Gardner Yates, professor of archeology in the university, tenable at University College, was elected vice-chancellor for 1924–25, in succession to H. J. Waring.

J. E. P. WAGSTAFF, fellow of St. John's College, Cambridge, and lecturer in physics in the University of Leeds, has been appointed professor of physics at Durham University.

DISCUSSION AND CORRESPONDENCE

A WIDESPREAD ERROR RELATING TO COPERNICUS

IN Volume 6 of the "New International Encyclopedia," 1923, under the word "Copernicus" we find the following statements: "Having become enamored of the study of astronomy, he projected a journey to Rome in his enthusiastic admiration of Regiomontanus, who resided there and was then the most illustrious of the astronomers. On his arrival, in 1500, he was kindly received by Regiomontanus." A somewhat similar statement appears on page 347 of volume 1, 1923, of Smith's "History of Mathematics," and also in the fourth edition of Lippincott's "Biographical Dictionary," 1915, under the name "Copernicus." An amusing feature as regards these statements is the

fact that Regiomontanus had died in 1476, more than twenty years before Copernicus arrived in Rome, according to the date given above. In fact, Copernicus was only a little more than three years old when Regiomontanus died, and hence the numerous references to his having studied astronomy under Regiomontanus, which appear in many places besides those noted above, are ridiculous.

The main justification for calling public attention to such errors seems to be that such publicity may tend to check the baneful influences of these errors, and hence it seems to be especially desirable to direct attention to the comparatively few errors which remain in the most meritorious of the extensively used books. In view of the fact that the present writer was criticized in a recent number of this periodical, volume 59, page 191, for directing attention to a minor error relating to a pioneer in mathematical research in our country, he would simply say that his remarks were not intended for those who see practically no difference between the statements "in charge of the Nautical Almanac," and "did much work on the Nautical Almanac," and "was consulting astronomer from 1849 to 1867." He would also like to state here that his interest in the correction of historical errors was not inspired by the feeling that he himself had never committed such an error, but, on the contrary, by the chagrin caused by being so frequently misled by authorities in whom he had placed undue confidence. The destruction of undue confidence is an important step in the study of the history of science.

G. A. MILLER

UNIVERSITY OF ILLINOIS

A NOTE ON MIGRATION OF MYRIAPODA

THE periodic migrations of certain insects and other animals have held the attention of biologists for generations and continue to afford items of fresh interest from time to time. A careful survey of the literature on this subject does not reveal any previous observations recorded on migrations of centipedes; in fact, it appears the universal consensus of opinion that centipedes do not migrate.

Last August (8–18–23), while crossing the desert stretch between Lordsburgh and Mesilla Park, New Mexico, in company of Professor Oscar B. Jacobson, of the University of Oklahoma, we encountered what appeared to be a migration of centipedes. We had driven along for a number of minutes paying little or no attention to the black objects scattered here and there in our pathway. When at last they became so numerous that the wheels of our Ford killed one every yard we stopped just long enough to notice that these objects were centipedes. They measured from five to seven inches in length and belonged to the genus Scolopendra, order Chilopoda. It was high noon when this scene was encountered. With only an occasional exception, these creatures were headed due north, progressing at a fair pace. A feature of unusual interest to me was their uniform distribution over the ground, each one apparently occupying a space of about four or five square feet. There was no vestige of vegetation present in this region nor even kindly rocks which might have afforded shelter for these creatures. We thought of possible mishaps to our "Lizzy," the thirsty radiator and perhaps a forced stay in this most uninviting, inhospitable environment and drove on. Fully ten more minutes were consumed in driving through this sea of centipedes, and countless victims remained behind in our tracks. We breathed a sigh of relief when the scattered outposts were reached and the burning sands alone reflected the heat of the brilliant desert sun.

I am at a loss to explain the phenomenon just cited. The time of the day when the observation was made does not agree with the normal habits of centipedes, which are nocturnal. Of course we know that certain birds, whose activities are restricted to daylight, make prolonged nocturnal flights during their migrations.

The nature of the terrain, sand without vegetation or rock shelter, coupled with the fact that all the creatures seen were adults and the mass movement was unidirectional, is, I believe, sufficient reason to preclude a breeding ground.

It is true that the month of August is in the rainy season of that section of New Mexico, for we were daily pursued by or chasing a storm until after we passed Tularosa on our way to Roswell. Tremendous quantities of water flow from all directions toward the principal depressions of the desert, the so-called sinks. If the presence of water had driven these centipedes from their haunts, why would they not scramble for dry ground in all directions?

Any theories suggested placing the responsibility for this phenomenon would, for the want of proof, remain as mere conjectures. To summarize: the time of the day when the observation was made, the enormous number of individuals making up this vast colony and the unidirectional course they pursued add only mystery to this observation until it is substantiated by someone else and studied at length.

JOSEPH M. THURINGER

DEPARTMENT OF HISTOLOGY AND EMBRYOLOGY,
SCHOOL OF MEDICINE,
UNIVERSITY OF OKLAHOMA

CORRECTION OF NAME OF SNAIL

RECENTLY, in SCIENCE of May 16, 1924, N. S. Vol. LIX, No. 1533, the writer published a note giving an account of the training of a snail in this laboratory. Unfortunately the writer had been incorrectly informed as to the proper designation of the subject

of the experiment. This fact was called to his attention. He is indebted to Professor Wm. H. Dall, Hon. Curator, Div. Mollusks, U. S. Nat. Museum, and to Professor Junius Henderson, Curator of Museum, University of Colorado, who after careful examination of specimens resembling the subject of the experiment pronounce the snail *Rumina decollata* Linne. According to these authorities these snails are natives of Europe and were introduced into this country and now flourish in Texas which is the source of supply of the snails being studied in this institution.

THOMAS R. GARTH
UNIVERSITY OF DENVER

INTERNATIONAL SEED EXCHANGE

NEARLY a hundred botanic gardens in different parts of the world issue annually or biennially a seed list for the purpose of mutual exchange. In the past two years nearly 3,000 different genera of plants have been offered in these lists.

The botanic gardens publishing seed lists are chiefly those of Europe. Outside of Europe are in Asia four, namely Tokyo, Sapporo, Buitenzorg and Tiflis; in Africa two: Kirstenbosch near Cape Town, and Tunis; in South America: Montevideo; in North America: Ottawa and Brooklyn.

Are there not other institutions, for example, in the Western States, or in Australia, that might be interested in receiving seeds from different parts of the world in exchange for those of their local plants? The undersigned invites correspondence regarding this matter.

ALFRED GUNDERSEN,
Curator of Plants
BROOKLYN BOTANIC GARDEN

SCIENTIFIC BOOKS

Nervous and Mental Reeducation. By S. I. FRANZ. pp. 225. New York, Macmillan, 1923.

STUDIES in reeducation were among Dr. Franz's first contributions, and this volume summarizes an accumulated experience in the subject. It is treated from the standpoint of reeducation of specialized capacities, as of paralyzed limbs or speech functions, and only briefly from the standpoint of the personality as a whole, for example, in the final chapter on "The Psychotic." The viewpoint is that of the physiological psychologist, distinctly from the therapeutic angle. The reading group to which it appeals is a broad one, including the physician interested in the management of voluntary motor dysfunction, and the non-medical specialist concerned with reeducative methods, as the occupational therapist. The first three chapters discuss general psychological principles as related to the special topic; here the author's clearness of style shows to exceptional advantage and makes one feel that if he is ever interested to do so, he can give us a text in general psychology to rival Woodworth's. In these pages and even more so in the second section of the volume, "General Reeducation Principles," he stresses the advantage of quantitative methods in reeducation. This is the portion of most interest from the point of view of experimental psychology, and contains suggestions that may well be assimilated into psychometric technique, *e.g.*, the hammer and nail exercise of p. 80, the tennis ball exercise of p. 87, the walking exercise of p. 110.

A drawback of the volume is its brevity, though this will be judged lightly by workers in allied fields who themselves venture on the task of writing books. It is apparent that chapters of a few thousand words, covering the reeducative aspects of poliomyelitis, of tabes, cerebral paralysis and speech defects, must be very fragmentary or very condensed. This book gives the latter impression. How much many who read the book for information will get from these chapters is an open question. Limitations of space seem to have excluded almost everything in the way of case material; the value of the latter for the present topic can hardly be overstated, and few can be in so good a position to make these contributions as Dr. Franz. This feature gives to the volume an introductory character, and a good deal is left to the further interest and learning capacity of the reader. In this connection one may wish that other and more casuistic work might be made better available by references, though Mackenzie's notable contributions to the general field are duly recognized.

On this topic from this author, one expects a work of great concreteness and practicality, and is not disappointed. It may be noted that Dr. Franz is one of the few whose contributions to the medical field have won him its honorary doctorate. On both psychological and medical sides, the book is stocked with management counsel. The hope must still be retained that the author will find time to give more insight into the rich casuistic material of which the matter of this book gives evidence.

F. L. WELLS

THE INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE

OPINIONS 78 TO 81

OPINION 78.—Case of *Dermacentor andersoni* vs. *Dermacentor venustus:* On basis of the premises presented, the commission is of the opinion that *Dermacentor venustus* dates from Marx in Neumann, 1897, type specimen Collection Marx No. 122 (U. S. National Museum), from *Ovis aries,* Texas, and that *Dermacentor andersoni* dates from Stiles, 1908, holo-

type U. S. P. H. & M. H. S., 9467, from Woodman, Montana.

Opinion 79.—Case of Lamarck's (1801a) Système des Animaux sans Vertèbres: "Rigidly construed," Lamarck's (1801a) Système des Animaux sans Vertèbres is not to be accepted as designation of type species.

Opinion 80.—Suspension of Rules in the Case of *Holothuria* and *Physalia:* The Echinoderm genus *Holothuria* Linn., 1767, restr. Bruguière, 1791, type *H. termula* 1767 = *H. tubulosa* 1790, and the *Siphonophorae* genus *Physalia* Lamarck, 1801, type *P. pelagica* 1801 = *Holothuria physalis* 1758, are hereby placed in the official list of generic names.

Opinion 81.—The Genotype of *Cimex, Acanthia, Clinocoris* and *Klinophilos:* On basis of the premises before the commission, the common bedbug of Europe, *Cimex lectularius,* is the genotype for *Cimex* 1758, *Acanthia* 1775, *Clinocoris* 1829, and *Klinophilos* 1899 (*Clinophilus* 1903), and its proper technical designation under the Rules is *Cimex lectularius. Cimex* Linn., 1758, type *C. lectularius* is hereby placed in the official list of generic names.

NOTICE TO ZOOLOGISTS OF CERTAIN GENERIC NAMES TO BE INSERTED IN THE OFFICIAL LIST

THE following generic names (with genotype in parentheses) have been submitted to the International Commission on Zoological Nomenclature for inclusion in the official list of generic names.

The secretary will delay final announcement of the votes on these names until November 1 in order to give to any zoologists, who may desire, the opportunity to express their opinions.

Protozoa: *Balantidium* Clap. and Lachm., 1858b, 247 (*entozoon*); *Endamoeba* Leidy, 1879a, 300 (*blattae*); *Giardia* Kunstler, 1882, 349 (*agilis*); *Trichomonas* Ehrenb., 1838a, 331 (*vaginalis*); *Trypanosoma* Gruby, 1843a, 1134 (*sanguinis*).

Cephalopoda: *Argonauta* L., 1758a, 708 (*argo*); *Octopus* Lam., 1799, Prodromus, 18 (*vulgaris*); *Sepia* L., 1758a, 568 (*officinalis*).

Gasteropoda: *Acteon* Montf., 1810, 314 (*tornatilis*); *Ampullaria* Lam., 1799, Prodromus, 76 (*urceus*); *Buccinum* L., 1758a, 734 (*undatum*); *Buliminus* Ehrenb., 1831 (*labrosus*); *Bulla* L., 1758a, 725 (*ampulla*); *Calyptraea* Lam., 1799, Prodromus, 78 (*chinensis*); *Columbella* Lam., 1799, Prodromus, 70 (*mercatoria*); *Helix* L., 1758a, 768 (*pomatia*); *Limax* L., 1758a, 652 (*maximus*); *Littorina* Feruss., 1821, Tabl. Syst., XXXIV (*littorea*); *Natica* Scop., 1777, 392 (*canrena*); *Physa* Drap., 1801, 31 (*fontinalis*); *Planorbis* Müller, 1774, 152 (*cornea*); *Succinea* Drap., 1801, 32 (*putris*); *Tethys* L., 1758a, 653 (*leporina*); *Vitrina* Drap., 1801, 33 (*pellucida*).

Lamellibranchiata: *Anodonta* Lam., 1799, 87 (*cygneus*); *Cyprina* Lam., 1818, 556 (*islandicus*); *Dreissena* Van Bened., 1835, 25 (*polymorpha*); *Mactra* L., 1767, 1125 (*stultorum*); *Margaritana* Schum., 1817, 137 (*margaritifera*); *Mya* L., 1758a, 670 (*truncata*); *Mytilus* L., 1758a, 704 (*edulus*); *Ostrea* L., 1758a, 696 (*edulis*); *Sphaerium* Scop., 1777, 397 (*cornea*); *Tellina* L., 1758a, 674 (*virgata*); *Teredo* L., 1758a, 651 (*navalis*); *Venus* L., 1758a, 684 (*mercenaria*).

Polyplacophora: *Chiton* L., 1758a, 667 (*tuberculatus*).

Scaphopoda: *Dentalium* L., 1758a, 785 (*elephantinum*).

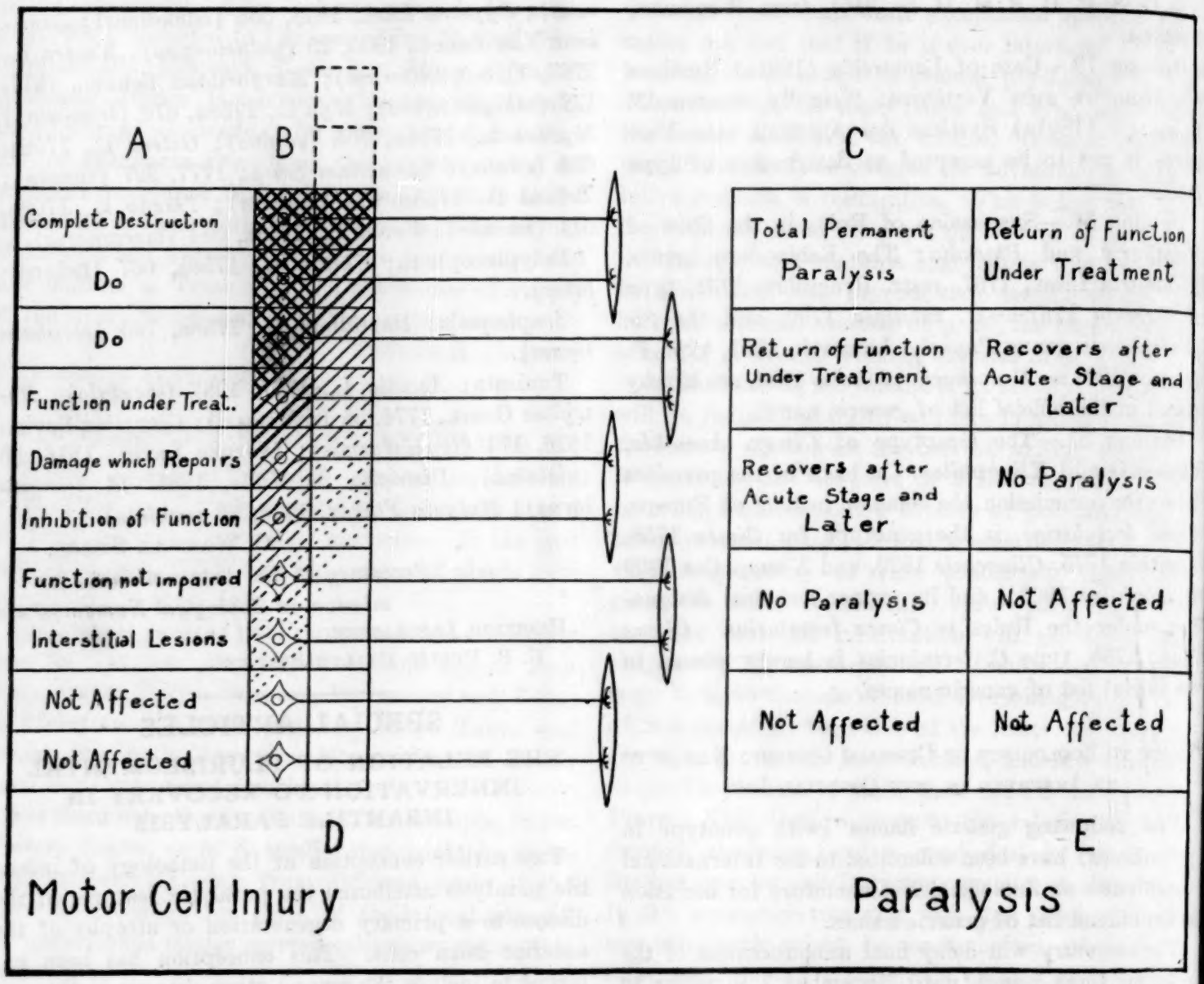
Tunicata: *Ascidia* L., 1767, 1087 (*mentula*); *Botryllus* Gaert., 1774, 35 (*schlosseri*); *Clavelina* Savig., 1816, 174 (*lepadiformis*); *Diazona* Savig., 1816, 35 (*violacea*); *Distaplia* de Valle, 1881, 14 (*magnilarva*); *Molgula* Forbes, 1848, 36 (*oculata*).

C. WARDELL STILES,
Secretary to the International Commission on Zoological Nomenclature
HYGIENIC LABORATORY,
U. S. PUBLIC HEALTH SERVICE

SPECIAL ARTICLES

THE RELATION OF PLURISEGMENTAL INNERVATION TO RECOVERY IN INFANTILE PARALYSIS

THE earlier conception of the pathology of infantile paralysis attributed the paralytic features of the disease to a primary degeneration or atrophy of the anterior horn cells. This conception has been enlarged to include the several other changes in the central nervous system which appear in the acute or paralytic stage of the disease, but damage to the anterior horn cells still holds its place as being directly responsible for the paralytic manifestations. The initial change in the motor cell itself in this disease is atrophy of the intracellular network of the neurofibrillae. The cell body swells and becomes more globular. With this swelling a disintegration of the Nissl granules occurs and often extends throughout the whole cell. In many instances the nucleus retains its normal appearance for a remarkably long time. Generally, it also retains its position in the middle of the cell. The nucleus may even remain after the peripheral part of the cell body is degenerated and dissolved. When a severer change occurs in the cell body, the nucleus is converted into a deeply staining irregular structure. Complete karyolysis takes place at times. Occasionally vacuoles may be seen in the protoplasm. Finally round cells invade and ingest the ganglion cells till only a clump of round cells with greatly increased protoplasm remains to mark the site of the ganglion cell. The nerve filaments of the gray matter are faintly stained and of irregular contour. Sometimes they present small swollen nod-



ules, or they may be degenerated so that only fragments may be recognized.

Although the muscular areas involved in the paralytic process have been more or less closely associated with the lesions in corresponding segments of the spinal cord, this can not be said to have been worked out in sufficient detail to permit an accurate correlation between the varying degrees of cell injury and the several grades of severity which are observed in the paralyses which result. Undoubtedly such a relation exists. A correct conception of this relation is highly desirable, especially from the standpoint of treatment of the paralyses.

During the past two and one half years, I have inoculated a number of monkeys (*Macaccus rhesus*) with a strain of the virus of infantile paralysis which was obtained on October 29, 1921, from the spinal cord of a fatal case of the disease. This virus has produced the experimental disease in monkeys in a milder form than is usually seen. For the most part the animals have recovered, but always with more or less paralysis. Hence it has been possible to observe the progress of the paralytic manifestations over varying periods of time. In respect to disability, atrophy, contractures and improvement, the events in the course of the experimental disease correspond to those in human beings. No attempt has been made to treat the individual paralyses, but the fact that these lame monkeys restrict their activities to a great extent is probably a factor in the improvement which takes place. In this respect, the animals may be compared with a patient following a régime of rest.[1]

The progress of these animals as to recovery from paralysis may be divided as follows:

Improvement in paralysis at termination of acute stage.
Improvement after six to eight weeks.
A gradual improvement later.
No improvement.

The improvement which occurs at the termination of the acute stage of the disease is often considerable and abrupt. These circumstances suggest that it is to be associated with the removal of factors which have merely inhibited the function of the motor cells, such as edema. The improvement which takes place after six or eight weeks or longer may also be exten-

[1] Jones, Robert, and Lovett, Robert W.: "Orthopedic Surgery," William Wood and Company, 1923.

sive as well as quite sudden. This we are inclined to associate with motor cells which have suffered actual injury and have undergone repair.[2] The gradual improvement which sometimes occurs seems more properly to be associated with the taking up of function by other motor cells.

Upon the unisegmental theory of innervation, the varying degrees of recovery are ascribed largely to the stimulation of remaining active fibers, but this does not entirely account for the improvement which takes place, especially that which comes late in the disease. The doctrine of plurisegmental innervation of individual muscle fibers which has recently been emphasized by Cattell and Stiles[3] seems to offer a more adequate explanation of the phenomena of recovery and to stimulate the hope that function may be restored in muscles which under the older conception are sometimes considered beyond repair. The manner in which plurisegmental innervation may operate in recovery is presented schematically in the accompanying diagram. The different degrees of motor cell involvement are given under A and illustrated graphically under B, with the corresponding paralysis shown under C. This schematic drawing shows both nerve cells of the first muscle fiber completely destroyed, which produces a total and permanent paralysis of this fiber. One nerve cell of the next muscle fiber is completely destroyed but its fellow is brought into play under reeducational treatment. The next cell represents the lesion which is associated with a paralysis which recovers sometime after the acute stage of the disease, while the sixth cell is one whose function is inhibited only while the acute process exists in the central nervous system tissue.

There is still a question whether the motor cell injury in infantile paralysis is produced by the direct action of the virus or toxins produced by it, or whether the injury is secondary to the interstitial lesions. There is considerable evidence that the latter is the case—that the nerve cell undergoes changes resulting from disturbances in its nutrition which are due to the interstitial lesions.

When it is recalled that the damage to the motor cells is accomplished in a very short time, one can not but be impressed by the effects which would undoubtedly follow even a slight reduction in the extent or duration of these interstitial lesions. Among the possibilities in this connection are the reduction of edema, the promotion of the circulation of the perivascular fluid, the destruction of even a small portion of the virus present by specific means, or the neutralization of irritating substances acting locally. Recent important advances in the physiology of the central nervous system[4] have opened new avenues of approach to this question.[5] It does not seem too much to hope that means can be found which will change the picture in the central nervous system to that represented in D, thus modifying the problem of the orthopedist to that shown in E.

W. LLOYD AYCOCK

FROM DEPT. OF PREVENTIVE MEDICINE AND HYGIENE, HARVARD MED. SCHOOL, BOSTON, AND THE RESEARCH LAB., VERMONT STATE BOARD OF HEALTH, BURLINGTON

[2] Buzzard, E. F., and Greenfield, J. G.: "Pathology of the Nervous System," 1923.

[3] Cattell, McKeen, and Stiles, P. G.: SCIENCE, 1924, N. S., LIX, 383.

[4] Weed, L. H.: *Jour. Med. Research*, 1914, N. S., XXVI, 93; Weed, L. H., and Hughson, Walter: *Am. Jour. Physiol.*, 1921, LVIII, 53; Weed, L. H., and McKibben, Paul S.: *Am. Jour. Physiol.*, 1919, XLVIII, 512.

[5] Aycock, W. L., and Amoss, H. L.: *Johns Hopkins Hospital Bull.*, 1923, XXXIV, 361.

THE AMERICAN CHEMICAL SOCIETY

SECTION OF HISTORY OF CHEMISTRY

F. B. Daines, *chairman*
Lyman C. Newell, *secretary*

Lewis C. Beck, M.D., a pioneer in the food and drug adulteration movement of America: L. F. KEBLER. Dr. Beck received both a literary and a medical training. He was identified with several institutions of learning, among them the Albany Medical College and Rutgers College of New Jersey. He taught materia medica, pharmacy, botany and other natural sciences. These all gave him a good background to write his book entitled "Adulterations of Various Substances Used in Medicine and the Arts," printed in 1846. In 1848 an appropriation of $1,000 was made by Congress to make certain chemical analyses. Dr. Beck was selected to do this work, and his two reports made in 1848–9 constitute the first records of the Department of Agriculture dealing with the great problem of food and drug adulteration.

A sketch of agricultural chemistry in America from 1663–1863: C. A. BROWNE. The history of agricultural chemistry in America is briefly reviewed from the time when Governor John Winthrop, of Connecticut, presented his report before the Royal Society upon the "Description, culture and use of maize," down to the time of the establishment of the U. S. Department of Agriculture in 1862. Rev. John Clayton's report on the "Observables of Virginia," in 1688, contains the first reference to the chemistry of American soils. The interest of Presidents John Adams and Thomas Jefferson in the practical applications of chemistry to agriculture is mentioned. Allusion is made to the early investigations of John Taylor, Gerard Troost, C. V. Sheppard, Edmund Ruffin, S. L. Dava, J. P. Norton, Evan Pugh, J. W. Draper, Ebenezer Emmons, Eben L. Horsford, Benjamin Silliman, Jr., C. A. Goessman, S. W. Johnson and other chemists and to their publications upon agricultural chemistry. A great impetus was given to agricultural chemistry in America in the decade 1840–1850 as a result of the publication of Liebig's "Chemistry in its Application to Agriculture,"

and of the beginning of the U. S. Patent Office reports upon agriculture. The latter contain contributions by Campbell Morfit, J. C. Booth, L. C. Beck, C. T. Jackson and other prominent American chemists upon agricultural topics.

Mauve: Perkin's discovery: BENJAMIN HARROW. In the early fifties, particularly under Hofmann's guidance, chemists took great interest in the artificial formation of natural substances. From Hofmann's remarks, Perkin was led to experiments on the artificial formation of quinine. As little was then known of the internal structure of compounds, the method of reasoning employed and the type of experiments undertaken in the conversion of one substance into another were crude. Perkin gives us an excellent example of this: "It (quinine) might be formed from toluidine by first adding to its composition C_3H_4 by substituting allyl for hydrogen, thus forming allyl toluidine, and then removing two hydrogen atoms and adding 2 atoms of oxygen. The allyl toluidine, having been prepared by the action of allyl iodide on toluidine, was converted into a salt and treated with potassium dichromate; no quinine was formed, but only a dirty reddish brown precipitate. Unpromising though this result was, I was interested in the reaction, and thought it desirable to treat a more simple base in the same manner. Aniline was selected; its sulfate was treated with potassium dichromate; in this instance a black precipitate was obtained, and, on examination, this was found to contain the coloring matter now so well known as aniline purple or mauve."

Charles W. Eliot—Chemist: LYMAN C. NEWELL. Charles W. Eliot, president of Harvard University for forty years, began his career as a chemist. While an undergraduate he did experiments by himself in Professor Josiah P. Cooke's private laboratory. Upon graduation, he became Professor Cooke's laboratory assistant, soon a tutor in chemistry, and finally assistant professor of mathematics and chemistry. When in Europe, from 1863–1865 he studied chemistry. In 1865 he was appointed professor of analytical chemistry and metallurgy at the newly opened Massachusetts Institute of Technology. In cooperation with Frank H. Storer, he made four original investigations and wrote two text-books. In 1869, he resigned to become president of Harvard University.

New light on phlogiston: TENNEY L. DAVIS. The phlogiston doctrine of Stähl appears to have been anticipated or suggested about a century before his time. Hapelius, in 1606, argued that phlogiston is the essence of the alchemical sulfur. He described an ingenious experiment in which sulfur is produced from antimony sulfide by the action of aqua regia, "common green brimstone, which *ipso facto* you will find to be phlogiston and you will find that it does not differ from common sulfur in that respect." The vocabulary of Hapelius, his problem and his solution of it are those which were later elaborated by Stähl and which dominated the science of chemistry until the time of Priestley and Lavoisier.

Pioneer applied chemistry in North America: GEO. L. COYLE, S. J. To obtain knowledge of the application of chemistry by the aborigines in North America, recourse was had to the missionary accounts of their customs sent annually to their superiors in Europe. These sources of information—The Jesuit Relations—cover a period from 1610 to 1754. Here we learn the methods of agriculture, the preparation of food, methods of making fire, cooking of maize, meat and fish, the preservation of fish and meat by smoking, the whale, porpoise and seal fisheries, whence the natives derived oil for food and toilet purposes, the drinks they used, their sources of roots and simples for medicine. Here also we learn of their clothing, textiles and skins, their primitive method of tanning and dressing leather, their sources of dyes and pigments, the colors for tattooing. We find them acquainted with the art of pottery, brick-making, the preparation of lime from shells, and even hydraulic cement. Descriptions are given of the copper mines of Lake Superior and elsewhere, of the aboriginal method of smelting lead, of reduction of iron ores and the forging of tools, metal working for utility and ornament. The discovery of salt and its use in preserving fish, petroleum, natural gas and coal were known to some tribes, altogether an interesting picture of applied chemistry in the 17th and 18th centuries.

John Maclean—Chemist: WILLIAM FOSTER. Dr. John Maclean (1771–1834) was the first professor of chemistry in the College of New Jersey, Princeton (1795–1812). He was born at Glasgow and was educated in the universities of Glasgow and Edinburgh and in London and Paris. Dr. Maclean specialized in surgery and chemistry, but he was a very broadly educated man. In his twenty-first year he became a member of the Faculty of Physicians and Surgeons, Glasgow, and his learned friends considered that he had no superior in Scotland. Being in sympathy with the political sentiments of America, he emigrated to this country in 1795, and came to Princeton where he delivered a short course of lectures on chemistry in the summer of that year, and in October was chosen professor of chemistry and natural philosophy, and taught with great distinction. As a physician, a surgeon, a natural philosopher, a mathematician, and, above all, a chemist, Dr. Maclean was eminent. Dr. Benjamin Silliman, the first professor of chemistry at Yale, saw his first chemical experiments at Princeton, and in his diary he acknowledges Dr. Maclean as his earliest master in chemistry and Princeton as his starting point in that subject.

Martin Hans Boyé (Lantern): EDGAR F. SMITH.

Researches in alchemy: ARTHUR J. HOPKINS.

M. Carey Lea's allotropic silver (with original samples): CHARLES E. MUNROE.

Memorabilia of famous chemists: EDGAR F. SMITH and LYMAN C. NEWELL.

The early iron industry in Alabama: ELTON R. DARLING.